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MONTHLY PROGRESS REPORT #2  
on the  
TERRAIN AVOIDANCE RADAR SYSTEM  
FOR THE PERIOD FROM  
30 JUNE TO 31 JULY 1957  
WESTINGHOUSE REFERENCE  
G.O. AAD-30465

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~~SECRET~~**CONFIDENTIAL**PROGRESS FROM 30 JUNE TO 31 JULY 1957ANTENNA:

Using parallel plates held apart by spacers at two inch intervals along the sides, and a small machined feed horn feeding in between the plates, experiments were conducted which gave us fairly smooth patterns and approximately 34" of scan. Experiments also revealed that the feed horn doesn't have to be inserted between the plates but may be outside up to a distance of .022 inches without the pattern deteriorating to any appreciable amount. Work is now being done to determine the best mechanical configuration so that the antenna may be fed from a rotary joint. Investigation is being made on existing low speed rotary joints with the intent of developing a high speed rotary joint.

"E" SCOPE:

The circuit design has been completed. A complete breadboard model will be built for use in the breadboard system test and in temperature testing to check out the design.

SYNCHRONIZER:

The circuit design has been completed. Layout of the unit has been started preparatory to submitting it to drafting. A complete breadboard model will be built for use in the breadboard system test and in temperature testing to check out the design.

"X" SCOPE:

The circuit design has been completed. Construction of a complete breadboard has been started.

AFC:

A breadboard of the AFC amplifier, discriminator and phanastron has been constructed and tested. A final layout has been determined and the unit is ready for drafting. The AFC locks up on approximately 30 MV of IF signal and has a repeller voltage control range of 180 volts in corresponding to a

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frequency range of 3 to 5 MCPS.

#### MODULATOR AND R.T.

A new trigger circuit has been designed and breadboarded. This stage amplifies the input of 10V at .1 us to over 200V at 2.5 us across a load resistor of 510 ohms. The only tube used is one 5687. Further work is still being delayed by lack of a magnetron.

#### RECEIVER:

A combined pre-amp and post-amp breadboard was constructed in one chassis.

The early stages of bench testing were completed and the calculated design values of gain, bandwidth, and shape of the selectivity curve were verified. However, the input coil secondary inductance was too high due to approximately one or two, more, micro micro farads of stray capacitance than were anticipated.

With the complete I.F. gain in one package with the layout that was used, the stability of the amplifier was marginal. The unshielded trifilar neutralizing coil was replaced with the shielded Cambridge LS9 form and additional stability precautions taken, however, it was felt that a greater safety margin is needed.

Work then started to lay out and construct a breadboard pre-amp and post-amp in separate boxes. This work is now progressing.

#### POWER SUPPLY:

A regulator circuit has been designed and breadboarded. The static or D.C. regulation has been checked and found satisfactory. Frequency response remains to be checked.

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FUTURE ACTIVITIES:

During the next month, design and breadboard testing of circuits will continue. The indicators, synchronizer, transmitter, receiver, and STC will be started through drafting. Receipt of a magnetron is expected so that detail design of the transmitter can be continued.

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Monthly Progress  
Report for July 1957.**APPENDIX I****Installation Investigation**

On July 11, 1957 three Westinghouse engineers visited the airplane manufacturer for the purpose of inspecting a typical A/C of the type designated for this installation. The various aspects of the radar equipment and its installation were discussed with two of the airplane manufacturer's engineers assigned to the project. This meeting resulted in the following observations:

1. "X" scope could be located in a satisfactory position in the pilot's instrument panel.
2. No existing place in the underside of the forward fuselage to mount the antenna - R-T package. This package required a space (approx. 20 inches high by 24 inches wide by 36 inches long) inside the fuselage in which to recess the antenna feed and R-T unit. A radome, having a frontal approximately 40 inches by 40 inches, with its accompanying fairing was required on the exterior of the fuselage.

The airplane manufacturer's engineers indicated that the APS-23 system might be removed from this A/C. Inspection of the APS-23 antenna and radome indicated that, with reasonable modifications the T. A. antenna package could be fitted into its location.

This was the only apparent feasible location in the fuselage for the antenna package. The A/C company engineers indicated the possibility of installing the antenna in a pod mounted on a wing tip. This was not considered desirable by Westinghouse engineers due to probable errors in the radar presentation produced by twisting of the A/C wings.

3. The remaining T.A. components could easily be installed in the waist section of the A/C, provided the APS-23 system were removed. Without the removal of APS-23 components, space for the T. A. equipment would be very difficult to obtain but was not considered impossible.
4. 400 Cycle power, in any great quantity, is not available. Even if the APS-23 system were removed, available 400 cycle power would be inadequate. It was pointed out by the A/C company engineers that there was an adequate supply of variable frequency (380 cy. to 1000 cy).

Subsequent to the above meeting, it was learned that the APS-23 system could not be removed in order to make room for the T.A. radar. The antenna package was reconsidered from the standpoint of eliminating the need for recessing any portion.

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On July 16, the A/C company engineers were asked to look into the possibility of mounting the antenna:

1. In a pod of 36 to 40 in diameter cantilevered from the side of the fuselage as far forward as possible.
2. In a blister type radome and fairing on the side of the fuselage.
3. In the present area of the nose observer's station.

On July 18, the A/C engineers reported that the pod and blister installations were not feasible since they could not be mounted close enough to the nose to permit a 30° side look. Installation in the nose observer's station was practical, provided the observers were omitted on missions during which the T. A. system was required. It was subsequently learned that the observer could not be omitted.

On July 22, the A/C engineers were requested to check the possibility of a chin type installation under the nose and immediately aft of the observer's window, and in such a manner that the DF and Beacon antennae, presently located in this region, could be dropped down to the under surface of the T.A. antenna tail fairing. It was anticipated that this installation would require a window frontal of 36 to 40 in. square without any recessing into the fuselage.

On July 23, the A/C engineer advised that this did not appear to be impossible but that a number of potential problems would have to be investigated, such as, increased loading on the APS-23 radome, air turbulence at the doors of the nose wheel well, reinforcement of the A/C forward section due to the additional weight and air load, and the possible need to add ballast. A few thousand manhours would be required to make this study.

The A/C engineer was advised that the requirement for frequency regulated power would be very small. The bulk of the T.A. power requirement could be taken from the unregulated source.

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